LETTERS TO THE EDITOR.

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The Supposed "Fascination" of Birds by Snakes and the "Mobbing" of Snakes by Birds.

I HAVE received the following interesting notes by Dr. J. Burton Cleland, of 93 Macquarie Street, Sydney. I may add to the observations recorded towards the end of his letter the behaviour of a common grey African parrot brought to this country as a young bird in 1904, and almost certainly without experience of hawks. One wing is clipped from time to time and the bird given much freedom in the garden. Twice I have seen it drop with a scream and crouch on the ground when an aeroplane has flown overhead at a rather low elevation.

EDWARD B. POULTON.

Oxford, February 11.

"Some twenty years or so ago, whilst walking in a garden in the outer suburbs of Adelaide, my attention was attracted by the behaviour of a small company of white-plumed honey-eaters (*Ptilotis penicillata,* Gld.). The individuals were making a considerable noise, and kept flying down to the lower branches of a carob-bean tree (St. John's Bread), where these overhung the pathway, and then up higher again, their attention being apparently attracted by an object on this path. The object proved to be a stock-whip, with long, snake-like lash and short handle. As thrown carelessly down the lash certainly suggested serpentine coils, and my impression, as noted at the time, was that they had probably mistaken the lash for a snake. Their behaviour was that manifested by other Meliphagidæ—for instance, *Myzantha garrula,* Lath.—in the presence of an enemy such as a bird of prey. The birds congregate together, make much noise, and fly about excitedly. In this way they may indicate the resting-spot of an owl disturbed from its sleeping-place by day.

"Several interesting points are worth considering. First, these honey-eaters had probably never seen a snake, though rarely an occasional one has been noticed in the neighbourhood. Secondly, as the birds spend their time near the tops of the eucalypts and build at the end of fine branches, and the snakes near Adelaide do not climb trees, even had they seen snakes these could have done them no harm. Thirdly, if my interpretation of their behaviour be correct, they recognised the 'snake' by its form alone, as no movement could take place. Though other unusual objects, but not snake-like in outline, must have been common in a large garden and its surroundings inhabited by children, the same fuss was not noticed to be made over them. From the above it would appear, provided their actions were rightly interpreted, that the birds or their immediate ancestors had probably never seen a snake, and had certainly never been subjected to danger from such; and that, therefore, the behaviour manifested, presumably to harass and drive away an enemy, must have been purely instinctive. In other words, on presentation to vision of, in this case, a motionless object of snake-like form, the brain-centres concerned with the methods of combating a foe were automatically stimulated, quite apart from the sensitising of such centres by previous individual experience.

"It is interesting to note here that the fowls in the poultry-run of the same house make a great noise and run for shelter when a hawk flies past through the trees, though none, so far as is known, had ever been attacked by hawks. Strange to say, another Australian bird, *Graucalus melanops,* Lath., may give rise to the same reactions, and I think I remember having noticed them also when one of the larger cuckoos (probably *Cuculus pallidus,* Lath.) flew overhead. Both these birds have peculiar flights, more hawk-like than those of pigeons, which, though about the same size, do not, in my experience, frighten poultry. The general form of the large cuckoo is also suggestive of a hawk like the kestrel (*Tinnunculus cenchroides,* Vig. and Horsef.). These reactions are again obviously purely instinctive, and not the result of personal experience."

The Shortage of Research Workers.

IN a paper recently read before the Royal Society of Arts on "The Government and the Organisation of Scientific Research," Sir Frank Heath directed attention to the dearth of skilled research workers, who are urgently needed to investigate industrial problems. All who have studied the question are agreed that in the near future the necessity for industrial scientific research will be greater than ever, and it may, therefore, be well to point out some preventable causes which are likely to make the situation worse instead of better.

During the war research departments have been established at most universities and colleges for special war purposes, and many capable workers have thus been discovered. At the present moment many of these departments are in process of demobilisation, and no concerted effort is being made to retain the services of those who have proved their worth as research workers, who are being allowed to find their way into other occupations. This waste of invaluable material is deplorable at the present juncture, and could be avoided by proper co-ordination between Government departments. A second matter, not so easily remedied, relates to the large number of scientific men who gave their services gratuitously during the war, but cannot be expected to continue this sacrifice in peace-time. No funds appear to be available for the provision of payment to such workers in case they are willing to take up industrial research in their spare time. Even when workers are willing to continue for some time longer on a voluntary basis, with the view of completing work in hand, it is not always possible to procure the small funds necessary for covering the expenses incurred in the work. The writer is acquainted with one research committee, dealing with problems of wide industrial application, which has been compelled to suspend its work owing to the withdrawal of funds by the Government department which financed its operations during the war. Nothing could be more deplorable at the present juncture than the discouragement of voluntary research, and in such cases immediate steps should be taken to provide funds from other sources.

The most disquieting feature, however, is the present financial condition of the universities and colleges from which the research workers of the future must be obtained. Whilst the cost of equipment has at least doubled, the incomes of these institutions have remained, in most cases, stagnant. This not only prevents the acquisition of adequate appliances for advanced teaching, but also debars the members of the staffs from obtaining the increases in salary rendered necessary by the increased cost of living. Many skilled teachers who have been on active service are declining to resume their pre-war appointments for this reason, and a serious shortage of

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capable instructors in advanced science is threatened. At present teachers of elementary science are better paid, on the average, than those engaged in the higher branches, and are additionally, in most cases, entitled to pensions under the Teachers' Superannuation Act. The obvious result of this anomalous state of things is that the ranks of higher scientific teachers will be depleted unless strong and prompt Government action is taken to place the universities and colleges on a sound financial basis. Unless this be done there is little prospect of obtaining the research workers necessary to secure the industrial future of the country.

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The Indian Rope Trick.

THE recent correspondence in the *Daily Mail* relating to the Indian rope trick is very similar to the controversies that have arisen from time to time in the Press in India, but nothing said seems to advance the evidence a jot further. The man who does the rope trick has yet to be produced!

During a considerable portion of a residence of more than thirty years in India, I studied Indian conjuring and made all the inquiries I could regarding this trick. I knew many of the best conjurers between Calcutta and Delhi, but never found one who had seen the rope trick. Several had heard of it, some believed in it, none could satisfactorily explain it.

Personally, I am of opinion that the rope trick is entirely mythical. I decline to accept the various theories put forward by amateurs in support of its practicability, such, for example, as hypnotism or substitution. The most likely explanation I have heard is that the trick is performed in a courtyard, that smoke obscures the view above, and that the rope is actually thrown up to a confederate, who fastens it to a beam which cannot be seen on account of the smoke; a lad then climbs up the rope and is similarly lost to view in the smoke, but even this theory is unlikely. It would not be impossible to arrange a scene on a stage where the rope trick could be performed as an illusion—not by a smoke screen, but by other means of hiding what happens above a certain height.

As to Indian conjuring generally, I consider it to be far behind European, though the sleight of hand is often extraordinarily good, and the methods occasionally ingenious, as, for instance, when conjurers apparently cause a few grains of wheat or gram to sprout in a few moments—a far better illusion than the overrated mango-tree trick.

Indian conjurers are very conservative and seldom produce new tricks, and they are very slow in discovering how a trick, new to them, is done even when performed by an amateur on well-known principles.

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THE USE OF HELIUM FOR AIRCRAFT PURPOSES.

SHORTLY after the commencement of the war it became evident that if helium were available in sufficient quantities to replace hydrogen in naval and military airships, the losses in life and equipment arising from the use of hydrogen would be enormously lessened. Helium, as is known, is most suitable as a filling for airship envelopes, in that it is non-inflammable and non-explosive, and, if desired, the engines may be placed within the envelope. By its use it is also possible to secure additional buoyancy by heating the gas (electrically or otherwise), and this fact might possibly lead to considerable modifications in the technique of airship manœuvres and navigation. The loss of gas from diffusion through the envelope is also less with helium than with hydrogen, but, on the other hand, the lifting power of helium is about 10 per cent. less than that of hydrogen.

Proposals had been frequently put forward by men of science in the British Empire and in enemy countries regarding the development of supplies of helium for airship purposes, but the first attempt to give practical effect to these proposals was initiated by Sir Richard Threlfall, who received strong support from the Admiralty through the Board of Invention and Research, under the presidency of Admiral of the Fleet Lord Fisher.

It was known that supplies of natural gas containing helium in varying amounts existed in America, and it became evident from the preliminary investigations made by Sir Richard Threlfall, and from calculations submitted by him as to cost of production, transportation, etc., that there was substantial ground for believing that helium could be obtained in large quantities at a cost which would not be prohibitive.

Prof. J. C. McLennan was invited by the Board of Invention and Research in 1915 to determine the helium content of the supplies of natural gas within the Empire, to carry out a series of experiments on a semi-commercial scale with the helium supplies available, and also to work out all technical details in connection with the large-scale production of helium and the large-scale purification of such supplies as might be delivered and become contaminated with air in service. In this work Prof. McLennan received assistance from his colleagues, Profs. John Satterly, E. F. Burton, H. F. Dawes, Capt. McTaggart, and Mr. John Patterson.

In the course of their investigations, which were carried out with the co-operation of L'Air Liquide Co., it was found that large supplies of helium were available in Canada, which could be produced at a cost of about one shilling per cubic foot.

In the summer of 1917, when the United States of America had decided to enter the war on the side of the Allies, and after the investigations referred to above were well under way, proposals were made to the Navy and Army and to the National Research Council of the U.S.A. to cooperate by developing the supplies of helium available in the United States. These were made, on behalf of the Admiralty, through the Board of Invention and Research by Sir Ernest Rutherford and a special Commission consisting of Commander Bridge, R.N., Lt.-Col. Lowcock, and Prof. John Satterly.

The authorities cited agreed to co-operate with vigour in supporting these proposals, and large orders were at once placed by them with the Air Reduction Co. and the Lynde Co. for plant, equipment, cylinders, etc. The Bureau of Mines also

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